Thus, the previous arguments are not moot and have not been particularly addressed by the Examiner. In the view of the Applicant, the arguments previously set forth should be persuasive even as applied to the new reference (Griesinger).

The following comments are offered specifically addressing the new rejection. Repetition of Applicant's previous remarks is necessarily incorporated, as they apply to the new rejection. This is both for the convenience of the Examiner and because these arguments have not previously been addressed with particularity.

Claim 1 has been rejected under 103(a) as obvious over Fosgate in view of Griesinger (5,796,844). Applicant respectfully disagrees. Although Fosgate does disclose a method of decoding two-channel, matrix encoded audio, the reference does not disclose the particular features recited in the claims of the present application. Although Fosgate does disclose a method of decoding two-channel, matrix encoded audio, neither Fosgate nor any other cited reference discloses the particular features recited in the claims of the present application. For example, Claim 1 recites the steps of "subband filtering the two-channel matrix encoded audio into a plurality of two-channel subband audio signals;" and also "synthesizing the mutichannel subband audio signals in the subbands to reconstruct the multichannel audio". Neither reference discloses subband filtering or synthesizing the subband audio signals; they disclose merely steering wideband audio, with all spectral bands steered in concert. The recited steps are simply not disclosed either in the cited locations or anywhere in the references.

Claim 1 has been slightly amended to clarify its meaning. As amended, Claim 1 also includes the step of "separately in each of a plurality of subbands, steering the two-channel subband audio signals into a plurality of two-channel subband audio signals." (emphasis added). In applicant's view the claim already referred to separately steering in each of a plurality of subbands, but this amendment clarifies this step. It should be clear now that this step is not taught by the cited reference. Since the reference does not teach separating each channel into a plurality of subband audio signals, it could not possibly teach "separately" steering the subband audio signals. Evem assuming that Griesinger teach teaches separately steering the two wideband stereo channels, it is clear that the reference does not teach separately steering the subband audio signals as recited. Note that the subband audio signals are clearly identified from the previous step, being

produced by subband filtering the two-channel matrix encoded audio into a plurality of two-channel subband audio signals. The two-channel subband audio signals cannot reasonably be confused with the undivided, unfiltered two-channel audio signal. Griesinger does not disclose two-channel subband audio signals—only two-channel wideband audio signals. Therefore, he could not disclose steering subband audio signals, separately or otherwise.

Note that the methods of subband coding and decoding are known as they apply to audio compression for transmission through noisy or band-limited channels. See, for example, Craig Marven, A Simple Approach to Digital Signal Processing, (John Wiley 1996), pages 162-164; Stephen J. Solari, Digital Video and Audio Compression, (McGraw Hill 1997), pages 163-185. The terms "subband filtering" and "synthesizing" have meanings which are well understood from the art of subband coding.

The office action also rejects claims 2, 3, 4, 6, 9 and 11 for obviousness under 35 USC 103(a) over Fosgate in view of Griesinger and Dressler. For the following reasons, the applicant disagrees and requests reconsideration of the rejection. As previously discussed, Fosgate in view of Griesinger does not teach the method of claim 1. The secondary references cited by examiner do not provide the suggestion or motivation to modify Fosgate in the manner of the invention. Note that Claim 4 has been slightly amended to more clearly describe the manner of subband steering according to the invention.

Rejection of these claims under Section 103 is based on the supposed teaching of the Dressler reference (B). Yet the Dressler reference does not teach a reconstructed audio comprising a plurality of dominant audio signals (as claimed). Dressler does not disclose any method for treating a plurality of simultaneous dominant signals, merely a means for switching between encoded positions as dominance shifts from moment to moment. Furthermore, the Dressler reference does not provide any suggestion or motivation to modify the prior art to obtain the invention as claimed, nor can it be combined with any other reference to obtain the invention as claimed.

The correct reading of Dressler (B) can be verified directly from the article itself. On the same page cited by the Examiner (page 7), line 25, the article defines "Dominant sound" as "simply that—the sound that is most prominent in the mix at any given instant

in time." Further down, in line 41, the article states "while two different sounds may seem to have the same average loudness, it is likely that, on an instantaneous basis, one of them will be dominant over the other and that the dominance will continuously alternate between them." This makes it clear that Dressler's definition of dominance is an instantaneous one: at any instant there can be only one dominant sound.

Clearly then, Dressler's system is limited to one dominant sound at any instant. The reference to enhancement on an "instantaneous basis" is misleading, but does not indicate the ability to handle multiple, simultaneous dominant audio signals. Dressler specifically defines dominance in a way that excludes multiple dominant signals any any given time. On page 8, Dressler states: "By definition, dominance can only occur in one place at any instant in time; it cannot exist in two places simultaneously, since their equality of magnitude would mean that neither is dominant." Rather, he must have intended instantaneous in the sense of "in close succession" rather than "simultaneous." This is made clear by the sentences beginning at line 51 (immediately following the sentence quoted by the office action), "in effect, time-division multiplexing its action among several individual sounds occurring in rapid succession. Even though the decoder is essentially providing directional enhancement for sounds at only one position at a time. . ." The Dressler system is capable of quickly shifting between two dominance positions or of providing a slower speed of switching, according to the nature of the musical content; but it does not reconstruct a signal with a plurality of dominant audio signals at any given instant. Nor does it identify any motivation to do so.

Because Dressler does not recognize the existence of multiple, simultaneous dominant signals (in different subbands), the reference does not and cannot provide any motivation to modify the teachings of Fosgate to handle multiple dominant signals (in different subbands). Nor is there any suggestion (outside of Applicant's disclosure) that such a modification would provide a more realistic sound. Dressler's definition of dominance excludes the very possibility of multiple dominant signals at any given instant. Furthermore, the reference does not indicate that there is any shortcoming in the prior method of detecting a single dominant signal at any instant.

Far from providing a motivation to obtain applicant's invention, Dressler B actually teaches away from the applicant's invention. Dressler clearly states "it is

sufficient to be able to detect a single direction of soundfield dominance, no matter how rapidly the soundfield changes." Page 8, Dressler B. This statement clearly and unambiguously teaches away from any modification to seek multiple dominant signals in different subbands, as applicant has claimed. The reference also teaches that in the case of sounds with similar intensities, little or no directional enhancement is needed. See Dressler, page 7, sixth paragraph. The Dressler article proposes that in such a case dominance is weak, and little steering should be applied to avoid an undesirable "indistinct or nervous soundfield". Page 7, seventh paragraph. Thus, in the case where two signals of almost equal intensity (but different locations) lie in different subbands, Dressler teaches that little or no steering should be applied (since there is no strongly dominant position). This approach is directly opposed to the applicant's method of separately decoding and steering dominant signals in each subband.

Similar argument applies to claim 3. Dressler clearly does not disclose a method of decoding wherein the dominant audio signals reside in different subbands, nor would it have been obvious to modify Fosgate to do so. Dressler does not recognize the necessity or desirability of separately steering in each subband, because he does not recognize the existence of a plurality of dominant audio signals, in different subbands. His own definition forbids such recognition. Furthermore, consideration of Dressler's block diagrams confirm that his system cannot handle a plurality of simultaneous dominant signals in different subbands (the signal is not separated into frequency subbands for separate steering).

Regarding claim 4, the office action has failed to consider the language "for each subband" (as well as the other limitations from claim 1, discussed previously). No combination of Griesinger and Fosgate can produce the present invention, because they cannot accomplish separate steering in separate subbands. The same argument applies to claims 6-9.

Regarding claim 11, the elements of parent claim 1 are simply not found in the Fosgate reference, as discussed above.

Although not directed at claims 2-4, 6 and 11, the rebuttal found below, in connection with Claims 5 and 17, may also be pertinent to claims 2-4, 6 and 11.

The office action asserts that Claim 5 is obvious over Fosgate in view of Griesinger and Davis et al. Applicant disagrees for the following reasons, and requests reconsideration.

The office action asserts that it would have been obvious to employ the bark bands of Davis et al. for the purpose of taking into account the psychoacoustic properties of the audio signal. On the contrary, it is not obvious for several reasons, beginning with the fact that psychoacoustic masking is not relevant to the goals of the present invention. The Examiner correctly points out that subband coding can reduce the amount of information transmitted in a particular frequency band where the resulting coding noise is psychoacoustically masked by neighboring spectral components. Such phenomenon is relevant in an encoder because it facilitates efficient coding for transmission of information through a band limited channel. In contrast, the present invention concerns a decoder or receiver, not an encoder. There is no incentive to utilize psychoacoustic masking or indeed any compression techniques, because the information has already been coded and transmitted before it even reaches the decoder which is the subject of the present claimed invention. It could not have been obvious to employ the bark bands of the Davis patent "for the purpose of taking into account the psychoacoustic properties of the audio signal" because the particular psychoacoustic properties of the audio signal (masking effects) are irrelevant to the invention.

Some background on subband coding may help understand the very different purposes of Davis compared to those of the present invention. The typical application of subband coding (and decoding) is for a purpose different from that in the present invention. Usually, subband coding and synthesis is used to reduce the bandwidth required to transmit or store information that has redundancy unevenly distributed through the spectrum. It is not conventionally used to enhance or manipulate the spatial perception of audio, as in the present application. More specifically, consider a typical application of subband audio coding: Before transmission through a communication (or recording) channel, the audio is subband filtered and the data is decimated. The

information is then coded with redundancy reducing techniques (compressed). The compressed data is then transmitted. Upon reception, the data is decoded in each subband. Each subband then goes through a subband synthesizing filter to recover the samples lost through decimation. The subbands are finally mixed to reconstruct the audio (approximately).

The language quoted by the office action is from the Davis patent and concerns the use of subband coding before transmission, to reduce the amount of information transmitted in a particular frequency band where the resulting coding noise is psychoacoustically masked by neighboring spectral components. The present invention does not pertain to the reduction of information to be transmitted; rather, the method of the invention is typically applied after reception and initial decoding of the audio data in a receiver. Davis does not disclose subband filtering of matrix-encoded audio, as presently claimed (claim 1). Rather, the Davis patent teaches subband filtering of audio signals for purposes of encoding the audio for transmission.

By contrast, in the present invention, subband filtering occurs in a decoder or receiver, after receiving the encoded audio. No compression is necessary or implicit. The subbands are separately steered only to enhance spatial perception.

While it may be obvious to break audio into subbands before encoding (to obtain benefits of better compression), it certainly is not obvious to break audio into subbands after transmission, in the decoder, as in the present invention. The claimed invention does not even presuppose any subband coding or subband filtering before transmission. After transmission, the psychoacoustic masking effects, and the advantages of compression, are irrelevant because the critical transmission of data has already been accomplished. In fact, subband filtering at a receiveror decoder is inconvenient, generally unnecessary and unconventional. (Subband filtering should not to be confused with reconstructive subband filtering, or synthesis filtering in a subband decoder, which is a quite different process, and which necessarily presupposes subband encoding by the encoder. )

The examiner's rejection of claim 5 also rests on the assertion that "psychoacoustic masking effects usually may be more efficiently exploited if the bandwidth of the frequency band is chosen commensurate with the bandwidths of the human ear's 'critical bands'." This statement is irrelevant because the present invention,

concerning a decoder, is not seeking to exploit masking. The goal of the present invention is opposite to that of the encoder: An encoder seeks to exploit masking; the present invention seeks to add realism and defeat masking by adding clarity and creating a convincing illusion of spatial definition.

In short, that which is obvious in a transmitter is not necessarily obvious in a receiver, because their purposes are quite different. It is obvious to affix postage to a letter before mailing; it is unusual to do so after receipt. Thus, there was no motivation in the prior art to apply the teachings of Davis, and Davis could not be combined with the teachings of Fosgate to produce the claimed invention.

Claims 7 and 8 should be found non-obvious for the same reasons discussed above in connection with claims 5 and 1. Note that claims 7 and 8 also refer to steering of the subband audio signals, not merely steering a composite, wideband signal.

Regarding claim 9, applicant points out that neither reference nor the combination teaches computing a dominance vector for each subband, as claimed. None of the cited references, in any combination, teach computing a dominance vector being determined by the dominant audio signals in the subband. The arguments set forth above in connection with claims 7, 5, and 1 are also applicable to claim 9.

Claims 12-14 have been cancelled.

Claim 15 contains limitations similar to those of claim 1: i.e., subband filtering, separately steering the subbands, and synthesizing the subband signals to reconstruct. This claim has also been slightly amended to more clearly point out the separate steering in each of a plurality of subbands, which is not found in the cited art. This claim and those depending therefrom should be found allowable for the same reasons set forth for Claim 1.

Regarding Claims 16 and 18, the examiner has conceded that "Dressler A fails to disclose the method of claim 15 wherein the reconstructed multichannel audio comprises a plurality of dominant signals that reside in different subbands." As discussed above, Dressler B does not admit of the possibility of a plurality of dominant signals at any given instant, thus provides no motivation to modify Dressler A or any other reference to obtain the present invention as claimed. As previously discussed, Dressler actually states that it is sufficient to compute a single dominant signal position at any time. The

references simply do not recognize, as the applicant has recognized, that multiple dominant signals may exist at a given time, each being dominant in a different subband and each having distinct spatial location. Thus the references provide no motivation to modify the prior art as in the claimed invention. Furthermore, no combination of Dressler A and Dressler B can produce the claimed invention.

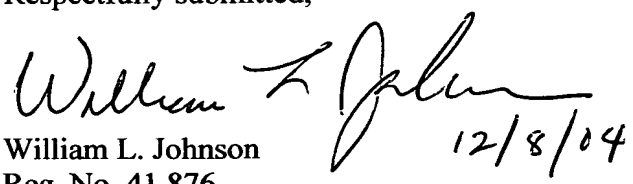
Regarding Claim 17, the remarks above in connection with Claim 5 are pertinent. The teaching of Davis, to reduce the amount of information transmitted in a band when the noise is psychoacoustically masked, is completely irrelevant in a decoder. The office action refers to masking of "the resulting coding noise" which emphasizes that the method is pertinent to encoding—not decoding. One does not gain any advantage by compressing the audio after reception. It is entirely analogous to locking the barn door after the cows have left the barn. Thus, it could not have been obvious to subband filter the subband signals into a plurality of bark bands in the claimed invention. Coding noise is not better masked by doing so. Nor would it have been obvious to "group" the subband signals into such bark bands, as claimed. Taking into account the specific psychoacoustic properties (masking) of the audio signal does not serve any obvious purpose after receiving and decoding. The purpose of the present invention is not to exploit masking; rather, the present invention is intended to defeat masking, and thereby enhance clarity and definition.

Claim 10 was objected to as dependent upon a rejected base claim, but was found otherwise allowable. In light of recent case law, applicant is compelled to avoid or defer amendments when possible (even purely formal amendments). Because Applicant is confident that other claims will be found allowable, amendment of Claim 10 has been deferred until it is apparent which parent claims will be allowed, if any.

Applicant believes that the arguments set forth above provide adequate reason for reconsideration of the rejection of claims 1-19 (excepting claims 12-14, previously cancelled), and that the claims should now be allowable. Should any further issues remain unresolved, the Examiner is urged to contact the undersigned attorney by phone to discuss the issues. The applicant believes that such an interview would be most productive in clarifying the issues. Please contact the undersigned to arrange a telephone conference to resolve any outstanding issues.

The undersigned had authority to file correspondence in this matter, pursuant to a previously filed Authorization to Act executed by the attorney of record. A copy is included with this correspondence, for the convenience of the Examiner.

Respectfully submitted,



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